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New developments in geographical names management and standardization in Saudi Arabia: the geographical names portal

Submitted by The Kingdom of Saudi Arabia **

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Background and Context

Geographical names are fundamental to a nation's identity, history, and cultural heritage. They provide essential references for navigation, governance, urban planning, disaster management, and commercial applications. Standardized geographical names ensure consistency across official records, facilitating seamless communication, decision-making, and data integration across multiple sectors. As the demand for accurate, authoritative, and easily accessible geospatial data increases, countries worldwide are adopting advanced digital platforms for geographical names management.

Recognizing the importance of structured geographical names administration, Saudi Arabia is developing the Geographical Names Portal as a centralized, digital platform for the collection, standardization, and dissemination of geographical names. This initiative is led by the General Authority for Survey and Geospatial Information (GEOSA), which serves as the national custodian for geographical names. The portal is designed to support smart governance, enhance geospatial data management, and facilitate digital transformation in alignment with Saudi Vision 2030.

The portal will function as an authoritative and integrated geospatial database, ensuring that geographical names are accurate, accessible, and interoperable with national and international geospatial systems. It will consolidate names from multiple sources, enriching them with linguistic, historical, and cultural insights while providing advanced functionalities such as interactive mapping, transliteration tools, and API-based data sharing. By modernizing geographical names management, the portal will strengthen Saudi Arabia's geospatial infrastructure, improve data consistency, and contribute to sustainable urban and economic development.

Scope and Objectives of the Paper

This paper provides a comprehensive analysis of the Geographical Names Portal, focusing on its development, features, and significance in Saudi Arabia's geospatial landscape. It examines how the portal integrates global best practices, adheres to international standards, and supports national initiatives such as Saudi Vision 2030. The scope includes an evaluation of the geodatabase structure, data standardization, and interoperability with national and international systems, ensuring the effective management and accessibility of geographical names.

The paper aims to:

Introduce the Portal – Outline its purpose, vision, and role in Saudi Arabia's digital transformation, emphasizing its significance in geospatial management, data standardization, and enhancing accessibility for government agencies, researchers, and the public.

Review Global Best Practices – Examine international geographical name systems, identifying effective data management practices, policies, and integration models that can improve Saudi Arabia's geographical names portal and ensure alignment with global standards.

Explain the Geodatabase – Provide insights into data models, schema design, and standardization principles, ensuring the portal's database structure allows efficient data retrieval, classification, visualization, and seamless integration with external geospatial systems.

Detail the Development Process – Outline the conceptualization, planning, design, and implementation phases of the portal, ensuring an iterative development approach that incorporates feedback and leverages the latest geospatial technologies.

Explore Features – Highlight the key functionalities of the portal, including centralized management, interactive digital mapping, data categorization, Romanization tools, and API services for integration with geospatial platforms.

Assess Benefits and Applications – Discuss how the portal supports urban planning, policy-making, research, navigation, tourism, and international collaboration, facilitating accurate and standardized geographical data for multiple industries and sectors.

Evaluate Impact – Examine how the portal contributes to mapping, navigation, cultural heritage preservation, and tourism, ensuring improved data accessibility, geospatial decision-making, and sustainable urban development.

Identify Challenges – Address key obstacles such as data accuracy, interoperability, sustainability, and user engagement, ensuring long-term reliability, maintenance, and continuous improvement of the GNP.

Through this structured analysis, the paper aims to contribute to discussions at the UNGEGN Session 2025, offering insights into the development of national geographical names management systems and their role in the global geospatial landscape.



The Geographical Names Portal

Geographical Names Portal

Overview

The Geographical Names Portal is a comprehensive digital platform designed to standardize, manage, and disseminate geographical names across the Kingdom of Saudi Arabia. Developed under the General Authority for Survey and Geospatial Information (GEOSA), the portal serves as the national authoritative source for geographical names, ensuring consistency in naming conventions, spelling, and transliteration. It will serve as a comprehensive national gazetteer that centralizes and standardizes geographical names across the Kingdom.

The portal is more than just a database; it is a dynamic platform that integrates geospatial data, historical and cultural insights, terrain details, and multimedia resources to provide a comprehensive understanding of Saudi Arabia's geographical landscape. The portal integrates advanced geospatial technologies, providing an interactive digital platform that enables users to access, search, analyze and visualize geographical names efficiently. It supports decision-making processes in urban planning, infrastructure development, and policy formulation by offering accurate, verified, and standardized geographical data. Additionally, it ensures adherence to international geographical naming standards, aligning with frameworks such as UNGEGN and ISO to maintain consistency, accuracy, and interoperability with global geospatial systems.

Vision and Objectives

Enable users to easily access standardized geographical names information across the Kingdom of Saudi Arabia.

The key objectives of the portal include:

- Develop a standardized national database for geographical names.
- Provide a reliable source for researchers, historians, media professionals, and tourists.
- Preserve and systematically document geographical names.
- Enable businesses and developers to integrate geographical name data into their applications.
- Empower government entities to effectively utilize geographical names in international and regional mapping efforts.
- Improve data analysis and management for more effective decision-making.

Alignment with Saudi Vision 2030

The Geographical Names Portal supports Saudi Vision 2030 by driving digital transformation, enhancing smart government, and enabling seamless data sharing. It aids urban planning, smart cities, and infrastructure development while preserving Saudi Arabia's cultural heritage. Open access to geospatial data attracts investment in tourism, logistics, and real estate, reinforcing national development and global collaboration.

Review of Best Practices

Effective geographical names management is essential for maintaining accurate geospatial data, supporting national and international mapping efforts, and preserving cultural heritage. Several international organizations, including the United Nations Group of Experts on Geographical Names (UNGEGN), the International Organization for Standardization (ISO), and national geospatial agencies, have established best practices for managing geographical names databases.

Key global best practices include:

Centralized National Gazetteers – Countries such as the United States, the United Kingdom, and Australia have implemented centralized digital gazetteers that provide standardized names, historical references, and authoritative sources. These systems ensure consistency in the use of geographical names across governmental and private entities.

Adoption of International Standards – Leading geographical names authorities align their databases with United Nations Group of Experts on Geographical Names (UNGEGN) and ISO 19112 standards. This enhances interoperability and enables seamless data exchange between different geospatial systems.

Public Access and Open Data Policies – Several countries have adopted open-access models, where geographical names data is freely available to researchers, government agencies, and the public. For example, the Geographical Names Board of Canada and the Australian Place Names Database provide interactive platforms that allow users to search and download place names.

Crowdsourced Contributions – Some national authorities integrate crowdsourcing to validate and update geographical names. For instance, New Zealand's LINZ Gazetteer allows public submissions that undergo expert review before official approval.

Multilingual Support and Romanization – Many global systems incorporate tools for transliteration, phonetic pronunciation, and multilingual representations of place names to support diverse linguistic communities and enhance accessibility.

Comparison Element	Australia	United Kingdom	Canada	New Zealand	United States
Name Pronunciation	No	No	No	No	No
Description of Name	Yes	No	No	Yes	No
Name Translation	No	No	No	No	No
Name Location Coordinates	Yes	Yes	Yes	Yes	Yes
Cultural Evidence	No	No	No	No	No
Historical Information	No	No	No	No	No
Name Categories	Yes	No	No	No	No
Linguistic Information	No	No	No	No	No
Name Origin	No	No	No	No	No
Administrative Boundaries	Yes	No	No	No	No
Land Use	No	No	No	No	No
Feature Type Categorization	Yes	No	No	No	No
Official Geographical Names Portal	Yes	Yes	Yes	Yes	Yes
Photographic and Video Content	No	No	No	No	No
Map References	Yes	No	No	No	No
Identification Numbers for Names	No	No	No	No	No
Online Gazetteer Publication	Yes	Yes	Yes	Yes	Yes

Below is a comparison of Geographical names portal features Across Selected Countries.

Geodatabase Structure and Schema

Overview of the Existing Geodatabase and Geonames Explorer

The existing geodatabase structure in GEOSA was initially designed with simplicity in mind, using only three feature classes:

Point Feature Class – Contained all geographical names, storing fundamental attributes such as Romanized name, province, category, feature type, and source.

Polygon Feature Class – Represented the geographical extents of areas such as mountains, lakes, and protected sites.

Line Feature Class – Captured linear features like rivers and roads.

While this structure provided a basic framework for storing and managing geographical names, it had significant limitations. One of the major constraints was that all geographical names were treated in a uniform manner, without the ability to incorporate feature-specific information. For example:

Lakes could not store attributes such as surface area, water depth, or seasonal changes.

Islands lacked information on their distance from the mainland.

Historical sites could not include rich metadata on their geographic background, historical significance, or cultural relevance.

This lack of flexibility made it difficult to provide comprehensive data for different geographical features. To address these issues, the geodatabase has been restructured with a more detailed and feature-specific schema.

Additionally, the current Geographical Names Explorer within Geoportal KSA lacks advanced tools for name management, research, and analysis. Ongoing enhancements aim to improve functionalities, ensuring better data enrichment and accessibility for users.

Proposed Data Models and Schema Design

To overcome the limitations of the previous schema, a new geodatabase model has been introduced. This new structure organizes data into multiple feature classes, each tailored to store attributes specific to different types of geographical features. The database includes different categories, such as:

- · Administrative regions and provinces
- Cities, towns, and villages
- Natural features (mountains, valleys, deserts)
- Water bodies (seas, rivers, lakes)
- Public infrastructure (streets, historical sites, public facilities)



Main geographical names categories in the portal

Key Enhancements in the Proposed Data Model

Feature-Specific Datasets and Classes: Instead of a single point feature class containing all geographical names, the new schema introduces separate feature classes grouped into specialized datasets. This structured approach enhances data accuracy, retrieval, and analysis.

- Administrative Regions Dataset: Covers provinces, cities, and districts, supporting governance and planning.
- Cultural Dataset: Stores heritage locations, archaeological sites, and historical landmarks.
- Education Dataset: Contains schools, universities, and research institutions for educational mapping.
- Geographical Names Dataset: Centralized repository for all named locations.
- Geology Dataset: Includes geological formations and land features.
- Health Services Dataset: Encompasses hospitals, clinics, and healthcare facilities.
- Marine Biosphere Dataset: Stores information on marine protected areas and biodiversity.
- Operational Supervision Dataset: Supports administrative and regulatory functions.
- Protected Sites and Reserved Areas Dataset: Covers nature reserves and conservation zones.
- Public Squares and Places Dataset: Identifies key public gathering spaces and urban centers.
- Religious Services Dataset: Includes mosques and other religious sites.
- Sport Dataset: Contains stadiums, arenas, and sports complexes.
- Tourism and Entertainment Dataset: Covers tourist attractions, parks, and recreational sites.
- Transport Dataset: Stores data on roads, railways, airports, and transportation hubs.
- Water Dataset: Includes rivers, lakes, reservoirs, and other water bodies.

This feature-specific classification enables detailed attribute storage, such as area size for lakes, historical significance for heritage sites, and road classifications for transportation networks, improving data usability.

Hadministrative_Regions			
🗗 Cultural			
🗗 Geographical_Names			
🗗 Geology			
Health_Services			
Harine_Biosphere			
Derational_Supervision			
Protected_Sites_And_Reserved			
Public_Squares_Places			
🖶 Religious_Services			
🗗 Sport			
Tourism_Entertainment			
🗗 Transport			
🔁 Water			

Datasets in the new schema

Schema Enhancements

Attribute Expansion: Each feature class now has attributes relevant to its category. For example:
Mountains: Elevation, geological history, prominence.
Lakes: Surface area, depth, water volume.
Cities and Towns: Population, economic classification.
Cultural Sites: Historical background, cultural significance.

Metadata and Quality Control:

ISO and UNEGN Compliance: Adhering to ISO 19110 (Feature Cataloging Methodology) and UNGEGN data management guidelines.

Spatial Reference System: Adopting the Saudi Arabia National Spatial Reference System (SANSRS), which incorporates KSA-GRF17 for horizontal referencing and KSA-VRF14 for vertical referencing.

Change Log and Version Control: Ensuring that all modifications, additions, and updates to geographical names are recorded.

Data Validation Mechanisms: Implementing automated checks for duplicate names, missing values, coordinate validation, and standardization consistency.

User Feedback Mechanisms: Integrating public and expert feedback systems to allow reporting of errors, suggestions for name modifications, and validation by geospatial professionals.

Integration with the Portal

The Geographical Names Portal is seamlessly integrated with the Enterprise Geographical Names Database, ensuring efficient data update, retrieval, visualization, and interoperability with other geospatial systems. Its scalable structure enhances accuracy and usability, supporting researchers and organizations.

Development of the Portal

Conceptualization and Planning

The Geographical Names Portal was initiated to create a standardized, accessible repository for Saudi Arabia's geographical names. Early planning identified key requirements, assessed database limitations, and aligned with international best practices. A roadmap was developed to transition from a basic feature-class system to a structured geodatabase, ensuring better data categorization and accessibility. Stakeholder consultations helped refine the portal to support governance, research, and heritage preservation.

Design and Architecture

Currently in the Design and Architecture phase, the portal builds on the prototype with an advanced modular framework. Features are distributed across categorized datasets for improved accuracy and retrieval. The system supports web-based access, bilingual functionality, and interoperability with national and global platforms. Scalability is a priority, allowing for future AI-driven validation and real-time feedback mechanisms.



Portal Design

Implementation

A prototype has been developed, validating core functions like search, spatial queries and visualization. The next phase will refine the interface, optimize database performance, and integrate APIs, automated validation, and improved visualization tools. Compliance with international standards and user experience enhancements will be key before full-scale deployment.

System Requirements

The portal is designed for high performance, scalability, and seamless integration with geospatial platforms, particularly ArcGIS. Key requirements include:

• Operating System: Compatible with Windows Server and Linux for cloud or on-premises deployment.

• Hardware: Multi-core CPU, high-capacity storage, sufficient RAM for spatial processing, and optional GPU for advanced visualization.

• **Database Support:** Works with ArcGIS Enterprise Geodatabase, PostgreSQL/PostGIS, and supports structured spatial data storage with regular patch updates.

• ArcGIS Integration: Fully compatible with ArcGIS Enterprise, ArcGIS Server, and ArcGIS Online, enabling smooth data visualization, automation, and API-based services.

Features and Functionalities of the Portal

The Geographical Names Portal is designed as a robust and user-friendly platform to manage and disseminate Saudi Arabia's geographical names efficiently. The system integrates cutting-edge geospatial technologies with comprehensive data management capabilities, ensuring accessibility, accuracy, and interoperability. The key features and functionalities of the portal are outlined below.



Main portal Functionalities

Centralized Management of Geographical Names

The portal consolidates geographical names into a single authoritative database, ensuring consistency across government entities, researchers, and the public. It accommodates linguistic, historical, and cultural attributes while maintaining version control for updates and modifications.

Interactive Digital Map

A web-based interactive map enables users to explore geographical names through spatial queries, filtering, and thematic visualization. It supports zooming, panning, and overlaying layers, with 3D visualization and satellite imagery for enhanced analysis.



Integrative Map

Categorized Geospatial Data Layers

Geographical names are structured into categorized layers, such as mountains, rivers, and cities, improving classification and retrieval. This enhances analysis for applications like urban planning, environmental studies, and cultural heritage management.

Administrative Boundaries

The portal incorporates administrative region boundaries, allowing users to view geographical names within specific governorates, provinces, and municipalities for better spatial analysis and governance.

Romanization Tool

A built-in Romanization tool ensures standardized transliteration of Arabic geographical names using internationally recognized methods.

English	تطبيق رومنة الأسماء الجغرافية	
		الاسم الجغرافي العربي:
	القِدَّيَّة	
		نتيجة الرومنة:
	Al Qidiyyah	
		نفذ الرومنة
	ف إكسل	رومنة الأسماء الجغرافية من مله
	نفذ المعالجة	No file chosen Choose File

Romanization Tool

API

Services

The portal provides API services for seamless integration with external geospatial platforms, government systems, and mapping applications. These APIs enable efficient data retrieval, enhancing interoperability, navigation, and geospatial analytics.

Publications

The portal provides downloadable resources, including a Geographical Terminology Book, Romanization Guidebook, and Saudi Gazetteer, to promote standardized naming and global alignment. These publications support research, policy-making, and geographical identity preservation.

Data and Content

The Geographical Names Portal will serve as a centralized repository for geographical names, enriched with key attributes such as coordinates, administrative divisions, and feature classifications. To preserve Saudi Arabia's heritage, the portal will incorporate historical narratives, cultural insights, and indigenous naming traditions, offering a deeper understanding of place names. Photographs and videos will further enhance visualization, providing users with an immersive and informative experience.

An interactive map with multiple basemaps will support diverse geospatial analyses, allowing users to explore geographical names in various contexts. This feature will be particularly valuable for urban planners, researchers, and government agencies. Additionally, the portal will include pronunciation and Roman-script representations to ensure accurate transliteration and standardization, enhancing consistency across institutions and making the portal a crucial resource for geospatial and linguistic studies.

Applications and Benefits

Applications

The Geographical Names Portal serves as a crucial tool in various sectors:

Urban Planning and Infrastructure Development: Provides standardized geographical data to support efficient city planning and infrastructure projects.

Government Agencies and Policy-Making: Assists in land management, administrative decision-making, and regulatory frameworks.

Research and Development: Facilitates academic studies and scientific research in geography, history, and environmental sciences.

Tourism and Educational Initiatives: Enriches cultural tourism and education through historical and geographical insights.

Mapping: Geographers, researches and organizations can utilize geographical names on the portal for creating various maps.



Core users of Geographical Names Portal

Benefits

The portal contributes to several key areas:

Standardization of Geographical Data: Ensures consistency, reliability, and interoperability across government and private sector applications.

Preservation of Saudi Arabia's Geographical and Cultural Identity: Protects and documents historical and culturally significant names, maintaining the nation's heritage.

Enhancing Geospatial Data Management and Accessibility: Provides structured and easily accessible geographical names for various applications.

Contribution to Sustainable Urban Development: Supports smart city initiatives and resource optimization through high-quality geospatial data.

Challenges and Considerations

Despite its advancements, the Geographical Names Portal faces several challenges that require strategic solutions for long-term success:

Data Accuracy and Validation: Ensuring the precision and reliability of geographical names and their attributes is crucial. This involves continuous verification processes, authoritative sources, and stringent quality control measures.

Interoperability with Other Systems: Seamless integration with national and international geospatial systems is essential for data exchange. Standardized formats, APIs, and compliance with global frameworks facilitate interoperability.

Maintaining and Updating the Database: Regular updates are necessary to reflect changes in geographical features, administrative boundaries, and cultural insights. A structured workflow for data maintenance, along with automation tools, ensures consistency and efficiency.

Training Requirements : Effective use of the Geographical Names Portal (GNP) requires training for both GIS professionals and general users. The GIS team needs expertise in geodatabase management, spatial data integration, and API usage, ensuring data accuracy and interoperability. A user guide with step-by-step instructions, FAQs, and tutorials will help users navigate the portal, conduct searches, and interact with maps, enhancing adoption and engagement across government agencies, researchers, and the public.

User Engagement and Feedback Mechanisms: Encouraging active participation from stakeholders, researchers, and the public helps improve data accuracy and usability. Implementing feedback loops, user-friendly reporting tools, and public contributions can enhance the system's effectiveness.

Conclusion

The Geographical Names Portal marks a major advancement in Saudi Arabia's efforts to modernize and standardize geographical names management. By leveraging a structured geodatabase, interactive mapping tools, and international best practices, the portal enhances data accessibility, accuracy, and usability for various stakeholders, including government agencies, geographers, researchers, and the public. It ensures seamless integration with national geospatial systems, reinforcing Saudi Arabia's commitment to digital transformation.

This paper has explored the portal's development journey, covering its objectives, conceptualization, design, implementation, applications and functionalities. It has also examined global best practices, challenges, and future prospects, emphasizing the portal's role in urban planning, governance, research, tourism, and cultural preservation. As the system evolves, expanding data coverage, strengthening interoperability, and fostering international collaboration will be key priorities. The portal will serve as a critical tool in preserving Saudi Arabia's geographical and cultural identity while contributing to geospatial innovation and national development in alignment with Vision 2030.

Points For Discussion

The Group of Experts is invited to discuss the following:

- (a) Aligning the portal with UNGEGN guidelines and international standards to ensure consistency, accuracy, and global interoperability;
- (b) Enhancing AI-driven validation, automated transliteration, and geospatial analytics for improved efficiency in geographical names management; and,
- (c) Identifying strategies for long-term maintenance, updates, and financial sustainability to keep the portal dynamic and relevant.

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